The synthesis of MgFe$_2$O$_4$ has been attempted starting from mixtures of 4MgCO$_3$·Mg(OH)$_2$·xH$_2$O and FeC$_2$O$_4$·2H$_2$O by combining mechanical activation of the mixtures (by high-energy milling) with annealing at temperatures between 673 and 1073 K. TG measurements of mixtures of the precursors have been performed to assess the reaction mechanism, and to determine the minimum temperature where the two binary oxides (MgO and Fe$_2$O$_3$) are formed. X-Ray powder patterns of the milled/annealed mixtures have shown that MgFe$_2$O$_4$ is formed in an amorphous state already upon thermal treatment at 673 K, while annealing of the mixtures (not mechanically activated) at temperatures as high as 1473 K of the mixtures does not lead to the complete formation of MgFe$_2$O$_4$. The molar specific heat and the Curie temperature of the milled/annealed mixtures have been determined by DSC: MgFe$_2$O$_4$ is obtained provided that the annealing of the milled mixture is performed at temperatures as low as 873 K. The effect of the annealing temperature on the surface area of MgFe$_2$O$_4$ has been determined by BET measurements.

Key words: Magnesium Ferrite, Mechanical Activation, Solid State Synthesis, Molar Heat Capacity, Surface Area